

Abstract

Educators who teach multiplication by rote memorization attempt to move their students rapidly toward determining correct answers at the expense of helping them reason deeply about the meaning of the operation. The purpose of our study was to explore the ways in which students think about multiplication and intervene to help them develop their mathematical proficiency. Four students completing third grade, two male and two female, participated. The study's theoretical framework and accompanying instructional approach were grounded in research-based multiplication learning progressions for the Common Core State Standards. Over the course of nine weeks, each participant completed a pre- and post- interview and engaged in seven instructional sessions. The interviews and sessions were video recorded, transcribed, and analyzed qualitatively to characterize students' emerging mathematical thinking. As we analyzed students' progress, we made conjectures about how to build their mathematical proficiency and prompt them toward more sophisticated multiplicative reasoning. We focused on arrays, equal groups, measurement, multiplicative comparisons, and rectangular area. During the final lesson, students successfully solved multi-step/multi-operation word problems. Those who had previously exhibited lower-level multiplicative reasoning patterns during their pre-interviews frequently used more sophisticated strategies during their post-interviews. One student who previously counted one-by-one to enumerate products began to predominantly use skip counting and exhibited some higher level reasoning. Our findings suggest that students should encounter various real-world contexts in which multiplication occurs and solve tasks in which it is inefficient to count one-by-one or skip count. Such activities can help prompt students to use higher-level multiplicative strategies.